

WAYNE STATE UNIVERSITY

Professional Record

NAME: Zhang, Sheng

DATE PREPARED: Feb. 29, 2003

DATE REVISED: Feb. 17, 2017

OFFICE ADDRESS: 1255 FA/B

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DEPARTMENT: Mathematics

PRESENT CLASSIFICATION: Associate Professor

APPOINTMENT DATE: August 19, 2002

YEAR AWARDED TENURE: 2008

CITIZEN OF: P. R. China

EDUCATION:

Doctoral:

Ph.D.in Mathematics, Penn State University, 2001.

Adviser: **Douglas N. Arnold**

Ph.D.in Computing Science, Chinese Academy of Sciences, China, 1990.

Adviser: **Hong-ci Huang**

Masters:

M.S.in Mathematics, Xian Jiaotong University, China, 1986.

Baccalaureate:

B.S.in Mathematics, Northwest University, China, 1983.

FACULTY APPOINTMENTS AT OTHER INSTITUTIONS (non-administrative appointments)

Visiting Assistant Professor, School of Mathematics, University of Minnesota,
2001-2002

Signed

Date

I. TEACHING

A. Years at Wayne State

August 2002 ---

B. Years at Other Colleges/Universities

August 1997 --- August 2001, Pennsylvania State University.

August 2001 --- August 2002, University of Minnesota.

C. Courses Taught at Wayne State in Last Five Years

1. Undergraduate

Mat 1000, Winter 2008.

Mat 1500, Winter 2003.

Mat 1800, Winter 2007

Mat 2010, Fall 2002, Winter 2004, Fall 2006, Winter 2012, Winter 2013.

Mat 2150, Fall 2007, Fall 2008, Winter 2013, Winter 2014.

Mat 2020, Winter 2003, Winter 2010, Winter 2012.

Mat 2030, Fall 2003, Winter 2004, Winter 2007, Fall 2013.

Mat 2350, Fall 2005.

Mat 2860/6130, Fall 2011.

Mat 3430, Winter 2006, Fall 2007, Fall 2008, Winter 2009.

Mat 5000, Winter 2011.

Sta 1020/Soc 5280, Fall 2006, Winter 2011, Fall 2013.

2. Graduate

Mat 5100, Fall 2003 and Fall 2004.

Mat 5220, Fall 2004 and Fall 2012.

Mat 5110, Winter 2006.

Mat 5230, Winter 2008, Winter 2009.

Mat 5600, Winter 2014, Winter 2016.

Mat 5228, Winter 2015.

Mat 6600, Winter 2016.

Mat 7200, Winter 2017.

3. Directed study

Godwin Iduma, Michigan Tech University, Undergraduate,
Load and dimensional strains upon an arch, supported
by NSF INGERT program, Summer 2003.

Feng Zeng, graduate student, Numerical methods, Winter 2005.

Ran Liu, graduate student, Numerical analysis, Summer 2007.

Michael Hern, graduate student, Analysis I, Winter 2014

D. Course or Curriculum Development

Proposed the topic course: **MAT 8000** - Mathematical models and numerical methods in structural mechanics.

Proposed topic course: **MAT 7270**, scheduled for Fall 2014.

With Prof. Zhimin Zhang, proposed the new course **Mat 5110: Numerical analysis II**. Developed the course curriculum. This course is now on the graduate course list of the Department of Mathematics. I taught this course in the Winter 2006 semester.

E. PhD. thesis committee served

Qingshuo Song (Department of Mathematics),
Ming Li (Department of mechanical engineering),
Lijing Sun (Department of Mathematics)
Huiqing Zhu (Department of Mathematics),
Li Fan (Department of Mathematics),
Yaldo Christopher (Department of Physics),
Yuan Tian (Department of Mathematics),
Wei Ouyang (Department of Mathematics),
Hailong Guo (Department of Mathematics),
Mohammadebrahim Sarabi (Department of Mathematics).

II. RESEARCH

A. Research in Progress

1. Numerical analysis of linear elastic shells.
2. Enhancing the accuracy of a class of plate bending finite elements in view of the Discontinuous Galerkin formulation.
3. Theoretical investigation of singular perturbation problems with unbounded energies.

B. Pending NSF grant

CoPI of the proposal entitled ``Nonlocal theories derived from classical operators: Theory and implementation.

III. PUBLICATIONS

A. Journal articles Published

1. **Zhang, S.**, Discrete Korn's inequality for shells, *Calcolo*, DOI 10.1007/s10092-016-0185-0, 2016.
2. **Zhang, S.**, Analysis of a discontinuous Galerkin method for the bending problem of Koite shell, *Numerische Mathematik*, Vol. 133, page 333-370, 2016.
3. W, Xu, S. C. Lowe, **S. Zhang**, An analysis of irrigated agricultural outcomes under the prior Appropriation doctrine: hypothesis and applications, *Applied Economics*, Vol. 46, No. 22, page 2639-2652, 2014.
4. F. Celiker, L. Fan, **S. Zhang**, Z. Zhang, Locking-free Optimal Discontinuous Galerkin Methods for a Naghdi type arch model, *J. Sci. Computing*, Vol. 52, No. 1, page 49-84, 2012.
5. **Zhang, S.**, Analysis of finite element domain embedding method for curved domains using uniform grids, *SIAM J. Numer. Anal.*, Vol. 46, No. 6, page 2843 - 2866, 2008.
6. **Zhang, S.**, An asymptotic analysis on the form of Naghdi type arch model, *Mathematical models and methods in applied sciences*, Vol. 18, No. 3, page 1-26, 2008.
7. **Zhang, S.**, Zhang, Z., Invalidity of decoupling a biharmonic equation to two Poisson equations on non-convex polygons, *International journal of numerical analysis and modeling*, Vol. 5, No.1, page 73-76, 2008.
8. **Zhang, S.**, A domain embedding method for mixed boundary value problems, *Comptes Rendus de l'Academie, Paris, Series I*, Vol. 343, page 287 - 290, 2006.
9. **Zhang, S.**, Equivalence estimates for a class of singular perturbation problems, *Comptes Rendus de l'Academie, Paris, Series I*, Vol 342, page 285 - 288, 2006.
10. **Zhang, S.**, On the accuracy of Reissner-Mindlin plate bending model for stress boundary conditions, *Mathematical modelling and numerical analysis*, Vol. 40, No. 2, page 269 - 295, 2006.
11. Arnold, D.N., Madureira, A.L., **Zhang, S.**, On the range of applicability of the Reissner-Mindlin and Kirchhoff-Love plate bending models, *J.Elasticity*, Vol. 67, No. 3, page 171-185, 2002.
12. Xu, J., **Zhang, S.**, Preconditioning the Poincare-Stecklov Operator by Using Green's Function, *Math. Comp.*, Vol. 66, No.1, page 125 - 138, 1997.
13. Wang, M., **Zhang, S.**, The optimal preconditioning in domain decomposition method for Wilson element, *J. Comp. Math.*, Vol.15, No.3, page 193-202, 1997.
14. Huang, H.C., Xue, W.M, **Zhang, S.**, Splitting a concave domain to convex

- subdomains, *J. Comp. Math.*, Vol. 15, No.3, page 279-287, 1997.
15. Zhang, S., Preconditioning of stiffness matrix of local refined triangulation, *J. Comp. Math.*, Vol.12, No.2, page 113-117, 1994.
 16. Zhang, S., Preconditioner determined by a subdomain covering the interface, *J. Comp. Math.*, Vol.12, No.1, page 71-77, 1994.
 17. Zhang, S., On optimal preconditioning of second order elliptic equation in domain decomposition, *Math. Numer. Sinica*, No.2, 1993 (in Chinese) and *Chinese J. Numer. Math. Appl.*, No.3, 1993 (in English).
 18. Zhang, S., On the Relation between Convergence Factors of Additive and Multiplicative Schwarz Methods, *Chinese Science Bulletin*, Vol.39, No.7, 1993.
 19. Zhang, S., Domain Decomposition based on Preconditioning for 3-D problems, *J. Fudan University*, Vol.31, No.2, 1992.
 20. Zhang, S., Many subdomains parallel decomposition algorithm, *Selected Papers of Chinese Postdoctoral Researchers*, Beijing University Press, 1992.
 21. Zhang, S., Huang, H.C., Domain decomposition with overlapping and PCG method, *J. Comp. Math.*, Vol.11, No.1, page 63-72, 1993.
 22. Zhang, L.B., Zhang, S., On the pseudo-boundary relaxation of Schwarz alternating method, *Math. Numer. Sinica*, No. 4, 1992 (in Chinese), and *Chinese J. Numer. Math. Appl.*, No.1, 1992 (in English).
 23. Zhang, S., Zhang, L.B., On the convergence factor of Schwarz alternating method, *Math. Numer. Sinica*, No.3, 1992 (in Chinese), and *Chinese J. Numer. Math. Appl.*, No.4, 1992 (in English).
 24. Zhang, S., Huang, H.C., Parallel iterative domain decomposition method for elliptic equations---Two subdomains Case, *Math. Numer. Sinica*, No.2, 1992 (in Chinese).
 25. Zhang, S., Huang, H.C., Parallel iterative domain decomposition method for elliptic equations---Many subdomains Case, *Scientia Sinica, Series A*, No.12, 1991 (in Chinese), and *Science in China, Series A*, No.6, 1992 (in English).
 26. Zhang, S., Huang, H.C., Multigrid multilevel domain decomposition, *J. Comp. Math.*, Vol.9, No.1, page 17-27, 1991.
 27. Zhang, S., Huang, J.G., Parallel iterative domain decomposition method for elliptic equations---subdomain and dual subdomain decomposition, *Proceeding of the International Conference on Scientific Computation*, T. F. Chan and Shi Zhong-ci eds., World Scientific Press, Singapore, 1992.

B. Manuscripts

1. Zhang, S. A linear finite element procedure for the Naghdi shell model,

arXiv:1412.3660.

2. **Zhang, S.**, A discontinuous Galerkin method for the Naghdi shell model, arXiv-1405-1343.
3. **Zhang, S.**, Compact embedding in the space of piecewise H1 functions, arXiv:1302:7079.
4. **Zhang, S.**, Locking free approximation of Naghdi shell by linear finite elements.
5. **Zhang, S.**, Sharp convergence rate of domain embedding method for various boundary conditions.

IV. INVITED TALKS AT CONFERENCES

1. Invited speaker to the **2007 IUTAM Symposium on "Relation of Shell, Plate, Beam and 3D Models"**, April 23 to April 27, 2007 in Tbilisi, Republic of Georgia.
2. Invited speaker to **The second pacific rim conference of mathematics**, Shanghai, China, 2005.
3. Invited talk Invited talk to the session on Girkmann problem in the **10th US congress of computational mechanics**, held at Columbus, Ohio, July, 2009.
4. Invited to speak in the session on "Differential Equations and Applications" at the **2010 Spring Central AMS Meeting**, St. Paul, Minnesota, April 10-11 (Saturday-Sunday), 2010.
5. Invited to speak in the session on Numerical Analysis and Scientific Computing at the **2011 Spring Central AMS Meeting**, Iowa city, Iowa, March, 2011
6. Invited to speak in the session of Numerical analysis in geometric partial differential equations at "**2013 Spring Central AMS Meeting**", Iowa State University, Ames, IA, April 27-28.
7. Invited to speak at the "**Workshop on Frontiers in Computational and Applied Mathematics**", May 28-30, 2012, Hunan, China.

8. Invited to speak in the special session ``Discontinuous Galerkin methods for partial differential equations: Theory and applications'' in the first annual meeting of SIAM central section in Missouri University of Science and Technology, April 11, 2015.

V. SERVICE

A. Department

1. Served on the graduate student recruiting committee during the academic year of 2003 -- 2004.

2. Served on the election committee during the academic years 2003 -- 2008.

3. Served on the graduate committee during the academic years 2006 -- 2008.

4. Served on the Math Department chair search committee, 2008.

5. Did course scheduling for Mat classes with Prof. Menaldi, 2008 - 2009.

6. Doing course scheduling for Mat classes, 2009 - .

7. Served on the GTA committee, 2011 - 2013.

B. Professional

1. With Professor Zhimin Zhang, organized the **Spring 2003 Finite Element Circus** conference at Wayne State.

2. With Professor Nicolae Tarfulea of Purdue University Calumet, organized the **Special Session on Finite Element Methods and Applications** for the 2008 Spring Central Section Meeting of American Mathematical Society, Bloomington, IN, April 5-6, 2008.

3. With Professors Zhimin Zhang, Fatih Celikwe, and Jin Shi, organized the **2009 Midwest Numerical Analysis Day and Great Lakes SIAM conference** at Wayne State.

4. With Professors Zhimin Zhang, Fatih Celikwe, and Hengguang Li, organizing **Spring 2014 Finite Element Circus** conference at Wayne State

5. Reviewed papers for the following journals

Mathematics of Computations,

Mathematical Modelling and Numerical Analysis,

SIAM J. Numerical Analysis,

International Journal of Numerical Analysis and Modeling,

Journal of Elasticity,

Applied Numerical Mathematics,

SIAM J. Control and Optimization,

Discrete and Continuous Dynamic System, Series B.

Journal of Scientific Computing.